Qwest/Intrado Advanced 9-1-1™

PSAP INSTALLATION GUIDE

State of Washington

Version 2010.10.20

Intelligent Emergency Network™
A9-1-1™ PSAP INSTALLATION GUIDE
State of Washington

Version Date: 10/28/2010

Contents

1. INTRODUCTION

Welcome to the project for developing the infrastructure of Next Generation 9-1-1!

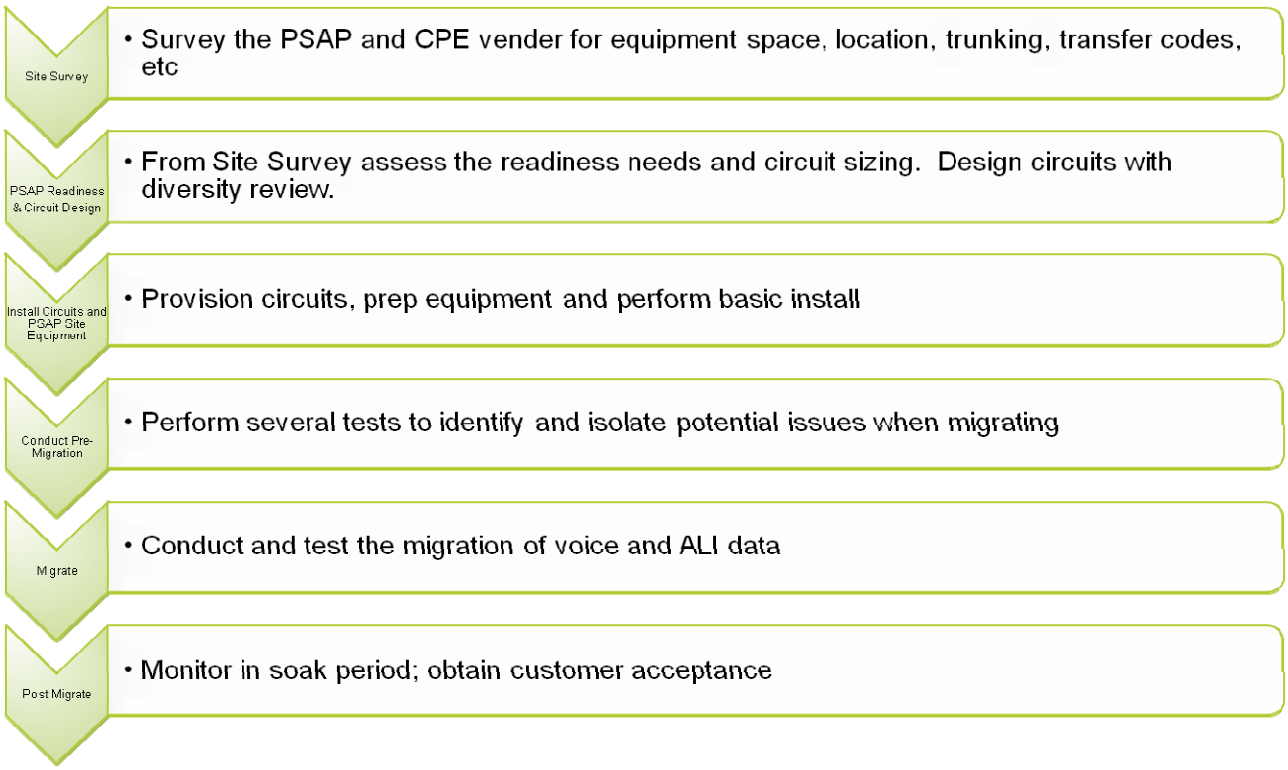
The A9-1-1™ Equipment Installation described in this document provides a list and description of equipment and the installation requirements for the equipment to successfully deploy and implement A9-1-1™ Routing services ("A9-1-1 Routing") and ALI Management services.

This project's objective: Develop an IP network and provide IP connectivity to all Washington PSAPs. In essence, the project is laying down the infrastructure to enable Next Generation 9-1-1 applications. These applications are down the road and will require extensive planning. Those efforts will be addressed in separate projects and are not within this project's scope.

For this project, the goal is to implement the Next Generation 9-1-1 infrastructure with limited disturbance of current PSAP operations.

2. APPROACH OF IMPLEMENTING WA NG911 PSAPS

Qwest, with its vendor partners, will be following an implementation methodology with the steps outlined below.



3. PSAP SITE SURVEY

The first step in the PSAP installation process is the PSAP site survey. A Qwest representative will schedule an appointment with the PSAP to assess the PSAP facilities and determine if additional space, equipment, power, or HVAC is required. The representative will interview and document current facility information to accumulate as much information as possible in order to provide for a smooth installation. The site survey includes the following categories:

- General administrative information
- 9-1-1 PSAP equipment inventory
- Administrative telephone Information
- Equipment delivery
- Physical Site Survey (Equipment Placement)
    - Equipment Cabinet Location
    - Electrical and Grounding
    - Environmental Evaluation
- 9-1-1 Trunk List
- Transfer List

4. PSAP READINESS AND CIRCUIT DESIGN

From information obtained from the Survey, the Qwest Team will begin PSAP Readiness and the Qwest Design Team to design the supporting circuits, accounting for diversity where possible.

For PSAP Readiness, you will be working with either the survey team or a Project Manager in walking through the items that need to be in place before the equipment can be installed at the PSAP site.

Example PSAP Readiness items will include having the proper space, electrical, grounding, and humidity requirements (outlined in a later section of this guide). For Circuit Design, the Qwest Team will be reviewing the information from the survey to design the appropriate circuits for connecting your PSAP to the Next Generation 9-1-1 network.

5. INSTALL CIRCUITS AND PERFORM BASIC INSTALL

The Circuit and basic installation of the equipment occurs next with the circuits needing to be installed first. Note: Circuit technicians may be from an Incumbent Local Exchange Carrier (ILEC) and not from Qwest and may not understand what the circuits being installed are for when they arrive to perform their needed piece of making the connections at your site. At Qwest, we will do what we can to give you as much advanced notification as possible.

Once circuits are connected, the Install Team will arrive at your PSAP to perform the basic install process. This process can take up to three (3) days typically beginning on a Tuesday, and the Install Team will need access to the PSAP during that time. There may be some rudimentary connection required from the PSAP controller to the PGM during the last day. If needed, we will work with you to coordinate a visit with your supporting CPE Vendor Technician for the install.

This installation, once completed, will not be connected to your PSAP equipment; it will sit as a stand-alone, though remote testing will be continually conducted.

At this time, specifications will be determined for connecting the ALI circuits that will require contact coordinating with your CPE vendor technician to build the ALI cables that will connect at a designated connection point specified from the Installation technicians.

6. CONDUCT PRE-MIGRATION TESTING

Approximately two (2) weeks before migration, Pre-Migration Testing will be conducted, requiring your attendance along with your supporting CPE Vendor technician. This test will be conducted during normal business hours and will require a couple trunk connections. The test should take 2 to 4 hours.

7. CONDUCT THE MIGRATION

Upon successful completion of Pre-Migration testing, the Team will be prepared to conduct the Migration. This deployment will be conducted during the maintenance window, requiring your attendance along with your supporting CPE Vendor technician. The Migration process should not take longer than three (3) hours. Note: If testing fails or if the migration is not working as expected the PSAP will move back to the legacy CAMA trunks and migration will be rescheduled.

8. POST MIGRATION

Qwest will monitor and continually communicate with you on Post Migration status. After a period of time during which no issues are experienced, Qwest will request your acceptance of the installation. The Qwest team will be prepared to address and troubleshoot events, should they surface. Should unexpected events of high severity occur before the completion of the acceptance period, it will be possible to re-connect to the previous legacy environment.

9. PSAP FACILITY AND EQUIPMENT REQUIREMENTS

Qwest and Intrado are partners in the effort to upgrade your PSAP to the Next Generation Network. Intrado technicians will lead the installation effort for the equipment required.

The new PSAP Equipment is installed in 20 Rack Units of one standard data center 19" equipment rack. It requires approximately 24" X 108" of floor space. These dimensions enable the 35" of space in front and behind the rack, which is required for proper airflow and to enable a technician the adequate space to perform equipment installations and maintenance. The sides of racks should also be located at least 36" from the nearest wall.

In the event that the PSAP desires to place the Intrado PSAP equipment into a pre-existing rack location, the PSAP rack will accommodate 20 contiguous rack units of space in a single rack at a minimum. PSAPs with more than twelve (12) trunks will require additional space. Please contact your Qwest Project Manager if additional information is needed. Each rack unit equals 1.75 inches.

The equipment rack(s) will be anchored to the floor, ceiling, or adjacent racks to meet earthquake codes for seismic bracing and protection of the equipment.

The facility structure will support an equipment rack weighing up to 350 lbs.

Lighting should be adequate for servicing the equipment.

The Intrado provided rack should be located within 20 feet of the Qwest or the incumbent local exchange company's main building demarcation point and the PSAP CPE. If this is not possible, it will be the responsibility of the appropriate LEC to arrange for the extension of the network termination points to within 20 feet of the mutually agreed upon rack location. This will be coordinated by Qwest Project Management when the new circuits initiated by Qwest are installed prior to equipment installation.

Ideally the PSAP Equipment rack should be installed in a secure location within the PSAP premise in an area that can easily be monitored by on-site staff at all times. The rack should be located in an area that does not receive consistent building traffic.

9.1 Electrical and Grounding Requirements

Two (2) dedicated 110volt / 20amp power feeds are required with:

- A & B feed (separate power source for each feed)
- Receptacle Plug type L520R Twist Lock
- Surge protection on telecom facilities and power lines.
- Grounding system

It is recommended that an Uninterruptible Power Supply (UPS) system be used to provide power to the equipment with the UPS fed from diverse utility power feeds whenever the PSAP's equipment is also powered by a UPS system.

Any metallic component that is part of the PSAP infrastructure (such as equipment, racks, ladder racks, enclosures, cable trays, etc.) must be bonded to the grounding system.

As much as possible the new equipment wiring should be separated from any radio coax and or grounding if possible to prevent induction (bleed over) into cables transporting digital signals.

9.2 Cooling System Requirements

Data Center HVAC systems must maintain a constant temperature between 68°-74° Fahrenheit. Humidity parameters must be maintained between 35% and 50 % Relative Humidity.

9.3 Ownership and Insurance

Intrado will maintain ownership of all Intrado PSAP Equipment. Intrado may, at its discretion, remove, replace, or upgrade Intrado PSAP Equipment as reasonably necessary to provide A9-1-1 Routing. Intrado will provide insurance for all Intrado PSAP Equipment.

9.4 Equipment List

The following list identifies the typical equipment provided by Intrado required for a PSAP installation:

- Great Lakes Cabinet (Model Number GL 780 ES)
- MPOP (1)
- PSAP Gateway Manager (PGM) (Minimum of 2 based on number of 911 Trunks – see chart in section 10.)
- Patch Panel (1)
- Console Server (Term Server) (2)
- Cisco 2821 Router (2)

10. INTRADO/QWEST PSAP GATEWAY MANAGER CHART/BTU OUTPUT

At a minimum, two (2) PSAP Gateway Managers (PGMs) will be installed at each PSAP. The following chart represents the 9-1-1 Trunk to PGM equation.

Total PSAP 9-1-1 Trunks	Required Number of PSAP Gateway Managers
2 – 12	2
13 – 24	3
25 – 40	4
41 – 50	5
51 – 60	6
61 – 70	7
71 – 80	8
81 – 90	9

PGM BTU Output Chart	
Total PSAP 9-1-1 Trunks	**Required Number of PSAP Gateway Managers (PGM)**
2 – 8	PGM 4xFXS, 8xFXO: 46.07 BTU
9 – 18	PGM 4xFXS, 12xFXO: 49.82 BTU
19 – 32	PGM 4xFXS, 16xFXO: 53.58 BTU
33 – 90	PGM 4xFXS, 20xFXO: 57.33 BTU

Power Consumption of NG 911 Equipment	
Device	**Power Consumption**
Cisco 2821 (2 Routers Installed at a PSAP)	280W
PGM (At least 2 installed per PSAP – Number based on incoming trunk count)	Universal 85-264 VAC 1A max., 47-63 Hz
RSM 8R4 (Term Server – 2 Installed at PSAP)	*MAX load 12 Amps depending on that is plugged into the power strip

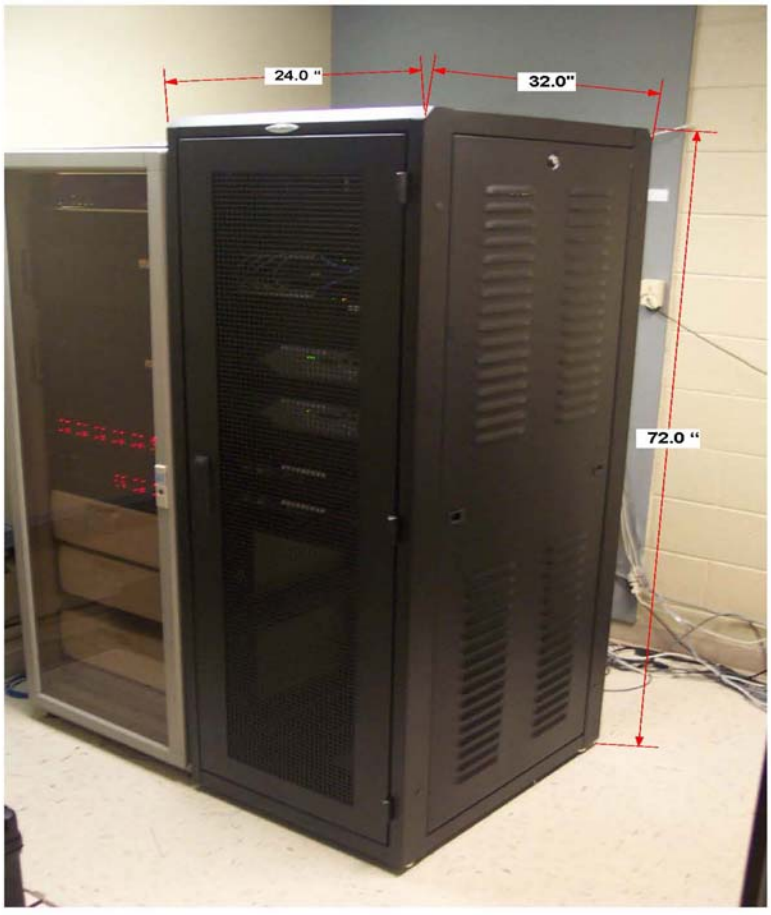
PSAP Equipment Heat Load		
Device	**Power Consumption**	**BTU/HR**
Cisco 2821	280W x 3.4129 =	955.6 BTU/HR
Cisco 2821	280W x 3.4129 =	955.6 BTU/HR
PGM	Universal 85-264 CAV 1A max., 47-63 Hz = 110VA = 77W	262.8 BTU/HR
PGM	Universal 85-264 CAV 1A max., 47-63 Hz = 110VA = 77W	262.8 BTU/HR
Total		2,436.8

11. PSAP CABINET

Standard installation includes a Great Lakes Cabinet pictured below. A Qwest Technician will conduct a site survey to help determine location of the cabinet within the PSAP.

The cabinet is offered in two (2) different sizes.

1. 24.0” Width, 32.0” Depth and 72.0” Height (Pictured below)
2. 24.0” Width, 32.0” Depth and 48.0” Height (Shorter version of Cabinet pictured below)



Title: PSAP Great Lakes Cabinet	Revision: 1.0	Drawing: PSAP CABINET	intrado
Description: Image with dimensions of PSAP cabinet for Advanced 9-1-1.	File: 1 of 1	This drawing is the property of Intrado Incorporated. Any duplication or distribution of materials herein is prohibited.	

Figure 1: PSAP Equipment Cabinet

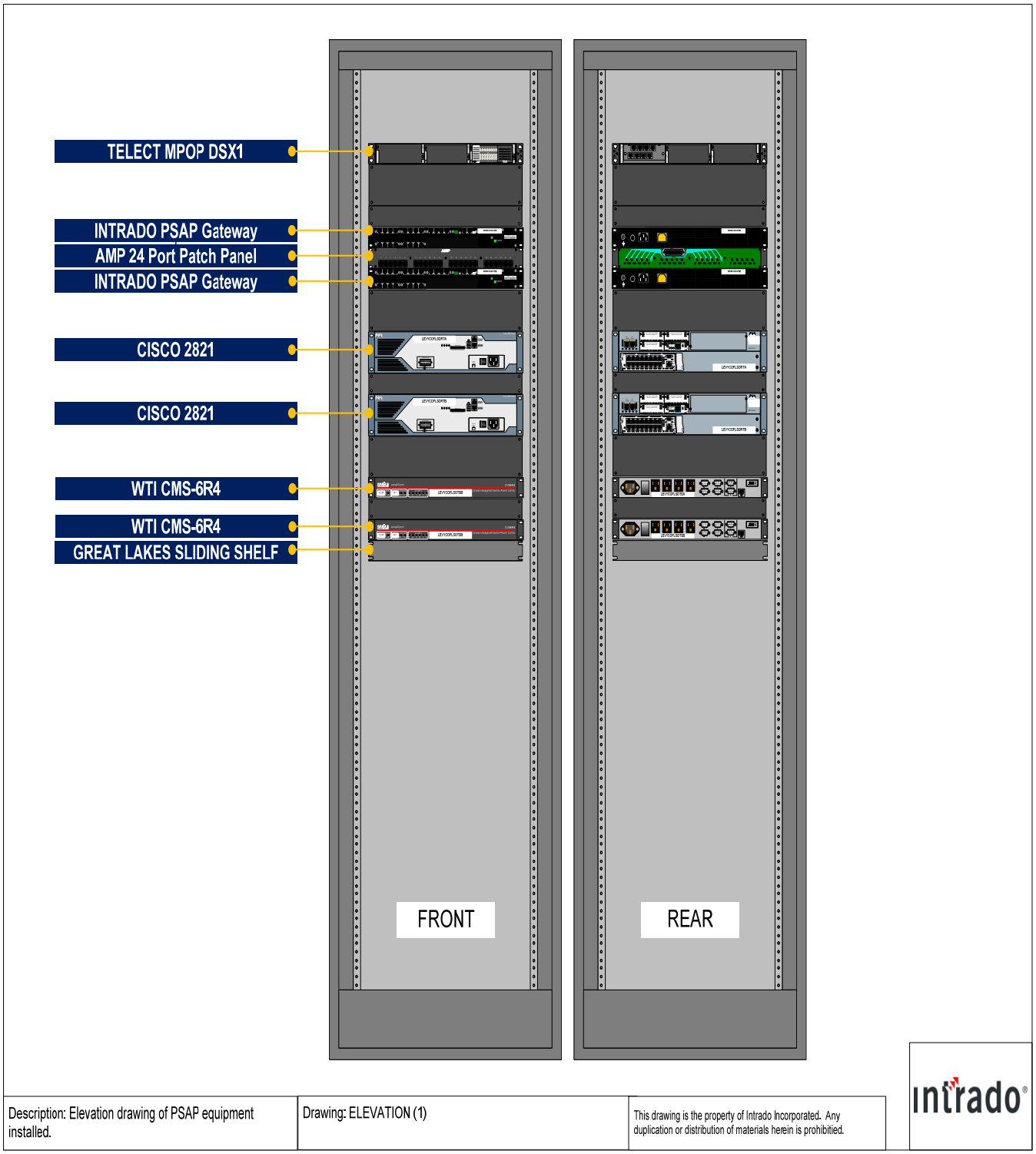


Figure 2: PSAP Equipment Cabinet Elevation Drawing including Equipment

12. EARTHQUAKE BRACING/ANCHOR KIT

PSAPs requiring earthquake bracing can install earthquake bracing supplied by the cabinet vendor for PSAPs with concrete floors. Figures 4, 5 and 6 provide a view of the location of the anchor holes and instructions for installing the earthquake bracing anchors.

For PSAPs that would like Qwest to install the earthquake bracing, please contact the Washington State 9-1-1 office technical staff (see contacts in **Section 14**). The state office will make the request directly to Qwest. Qwest will then provide a quote to the State Office and schedule to installation.

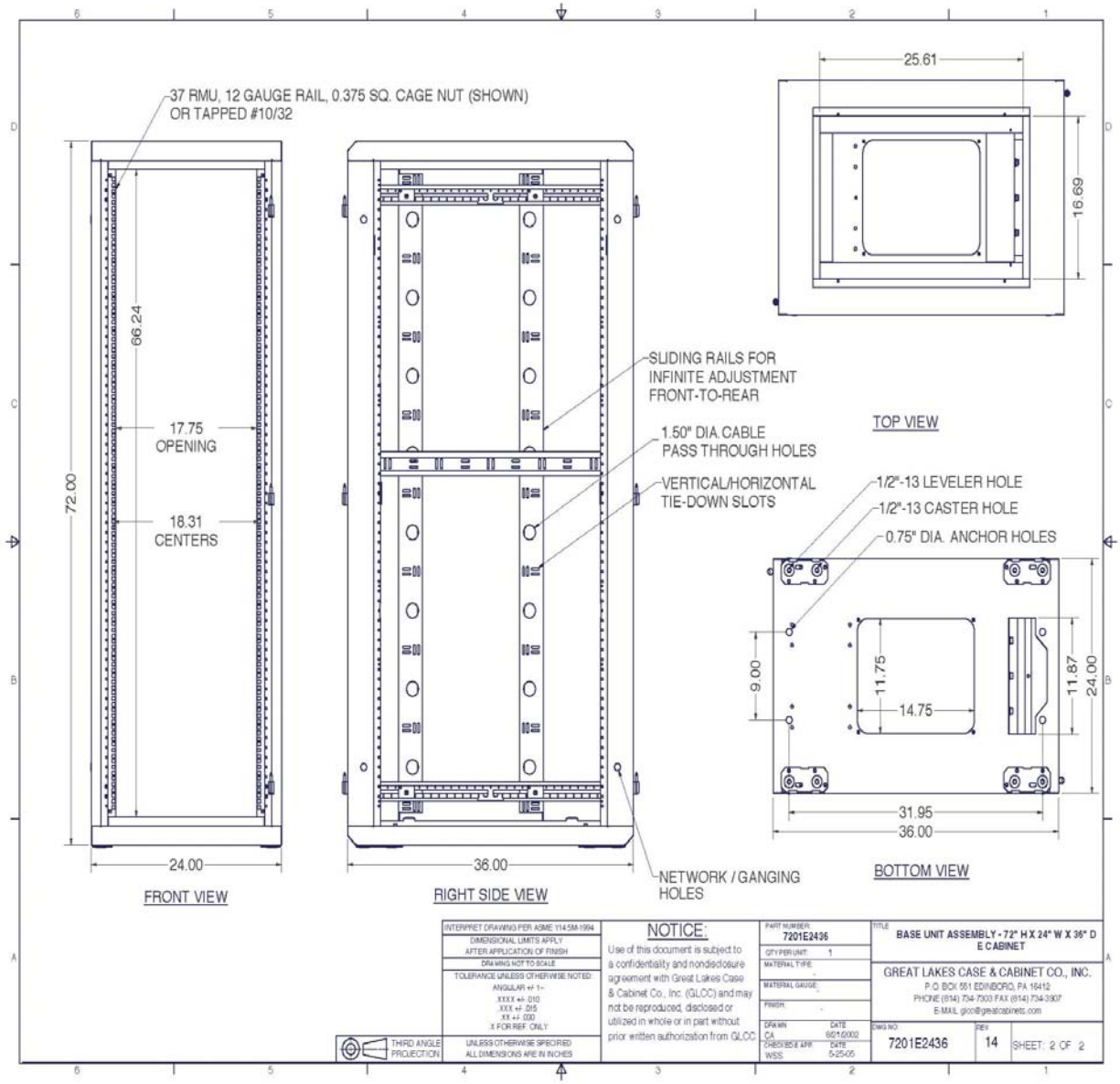


Figure 3: PSAP Equipment Structural Views/anchor holes bottom right corner

Figure 4: PSAP Equipment Seismic Anchor

Description

- Especially suited for seismic and cracked concrete (tension zone) applications
- Seismic qualifications tested in accordance with ACI 355.2 and ICC-ES AC 193
- Small minimum edge distance and spacing for maximum design flexibility
- Suitable for concrete over metal deck applications
- Rounded end for easy installation
- Meets ductility requirements of 318 D.3.3

Technical Data

Base Material

- Cracked and uncracked concrete
- Lightweight concrete
- Light to medium weight concrete over metal deck Anchor material
- Carbon steel, electroplated zinc min 5 microns Listings/Approvals
- ICC-ES (International Code Council) ESR-1917
- FM (Factory Mutual)
- UL (underwriters Laboratories)
- Qualified under an NQA-1 nuclear quality program

International Building Codes

2003 IBC Compliant Anchor
2006 IBC Compliant Anchor

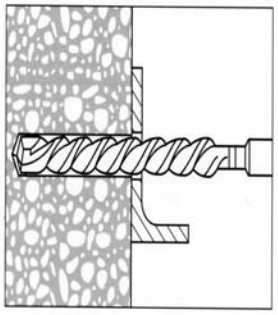
Anchor Specs

Hole diameter: 5/8"
Anchor length: 6"
Thread length: 2-3/4"
Embedded depth: 4-1/2"
Thread size: 5/8"

Tool Requirements

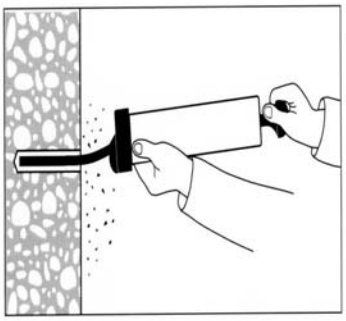
Drill
5/8" drill bit

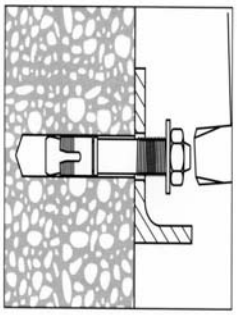
Installation Instructions



1. Hammer drill a hole to the same nominal diameter as the AK101 bolt (5/8). The hole depth must exceed the anchor embedment by at least 1/4 inch. The fixture may be used as a drilling template to ensure proper anchor location.

2. Clean hole.





3. Drive the AK101 anchor into the hole using a hammer. The anchor must be driven until at least 4 threads are below the surface of the fixture.

4. Tighten the nut to the recommended installation torque. 60 ft-lb. (81 Nm)

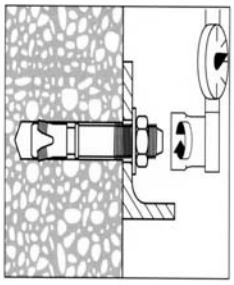


Figure 5: PSAP Equipment Seismic Anchor Instructions

13. ALI CONNECTIVITY

As part of the implementation, ALI bids use the new IP network. In order to transition to the IP Network, two (2) cables are required for connectivity between the ANI/ALI Controller and the newly installed routers. The cables connect the ANI/ALI Controller to the auxiliary (aux) port (RJ45) on the front of the router and must be Cat 5 cable or better. The **CPE technician for the PSAP** is responsible for building the cable and connecting the equipment. The ALI conversion to the new network occurs shortly after the Voice conversion to the new network.

The cable pinout for the RJ45 port on the Cisco router is a standard straight through configuration T568A or T568B.

14. PROJECT CONTACT INFORMATION

Contact Name	Organization	Project Role	Title	Telephone	Email Address
Rob Tiplin	Qwest	Project Management	Project Manager	206- 224-5518 (o) 425-761-0251 (c)	Rob.Tiplin@qwest.com
Dave Irwin	State of WA	Primary Technical Contact	E911 Network and Database Administrator	253-512-7017	d.irwin@emd.wa.gov
Jacqueline Randall	State of WA	Secondary Technical Contact	E911 Technical Manager	253-512-7015	j.randall@emd.wa.gov
Bruce Baardson	State of WA	Billing/Contract Contact	Customer Support Supervisor	253-512-7018	b.baardson@emd.wa.gov

Note: After PSAP migration to the NextGen Network, if you should encounter an issue where you believe the equipment, circuits, and/or network are not working as expected, please contact Qwest 911 Repair at **1-800-357-0911**. They will engage Qwest and/or Intrado to resolve the issue.

15. Frequently Asked Questions (FAQ)

- **Do the circuits ordered provide diversity?** The network is designed with enough capacity so that either T1 or multiple bonded T1s (depending on the number of PSAP trunks) can support all of the PSAP trunks should one T1 go down. In an IP environment you can lose a single T1 and still be at full trunk capacity. PGMs are not tied to any one circuit.
- **What if a PGM fails?** In a typical PGM environment two (2) PGMs are installed and PGMs are configured so that only the odd ports are active on PGM 1 and the even ports on PGM2. In the event of a PGM outage remote, hands could migrate the trunks from the out-of-service PGM to the in service PGM and be at full capacity.
- **Will the PSAP experience down time during the installation?** No, the installation does not effect your live 9-1-1 environment.
- **Should earthquake bracing be used?** Each individual PSAP decides if the cabinet needs earthquake bracing. For PSAPs with concrete floors Qwest/Intrado will provide a standard earthquake bracing kit.
- **When does the PSAP receive the equipment cabinet?** The cabinet will typically arrive on the Monday of the installation week. When possible all equipment will be racked in the cabinet for quick installation.
- **When will the equipment arrive?** The equipment will typically arrive on the Monday prior to the installation begin date.
- **How long will the installation take?** The installation will typically take 2 to 3 days to complete.
- **Do circuits need to be installed at the PSAP prior to equipment installation?** Yes at least one (1) circuit should be in place prior to installation of the equipment. Qwest will implement the turn-up of the necessary T1 circuits, coordinating with the LEC where needed. Having a circuit in place allows for the Intrado technician to do following:
  - Testing/Verification of communication between the PSAP equipment and the IP Selective Router.
  - Verification of Configurations (Configurations are typically done prior to shipment of equipment once installed configurations on all equipment are verified)
  - Verification that cabling is correct (all cables plugged into correct ports etc.)
  - Verification of signaling (for example, use of test calls to a butt set is used at PSAP installs)
- **Who provides the PSAP specific Circuit turn-up, Equipment Installation, and Migration schedule?** The Qwest Project Manager.

- **Who tests the new equipment in a live situation?** The Qwest Project Manager will coordinate with the PSAP to test the Next Gen Network and new equipment using a PSAP-provided test trunk about one (1) week prior to migration. This pre-migration testing will include, but is not be limited to, the following scenarios:
  - Generate calls to trunk tied to PGM from MPLS network used for the 9-1-1 Next generation network.
  - Test 1 button transfers.
  - Test 3 digit * code transfers.
  - Test Overflow for PSAP when trunks are traffic busy.
  - Test Overflow for PSAP when they have to abandon.
  - Test transfers to other PSAPs on NextGen Network.
  - Test transfers to other PSAPs (including back-up or night PSAPs) on Legacy Network.
- **If there is a problem with the equipment, circuits, and/or network, who should be contacted?**
  - Before PSAP migration to NextGen Network, contact the Qwest Project Manager.
  - After PSAP migration, contact Qwest 911 Repair at **1-800-357-0911**. They will engage Qwest and/or Intrado to resolve the issue.
- **Abandonment Routing/Make Busy Switch Issues**? In the Next Gen environment, your existing make busy switch will no longer be functional. In a PSAP abandonment situation, the PSAP should contact Qwest 911 Repair at **1-800-357-0911** to abandon the PSAP.
- **Does the PSAP need to provide E&M signaling on the new E9-1-1 trunks to the PSAP PBX?** The PSAP will need to provide the same type of trunk and same type of signaling that is provided to the existing E9-1-1 Network.

16. APPENDIX A: NETWORK DRAWING

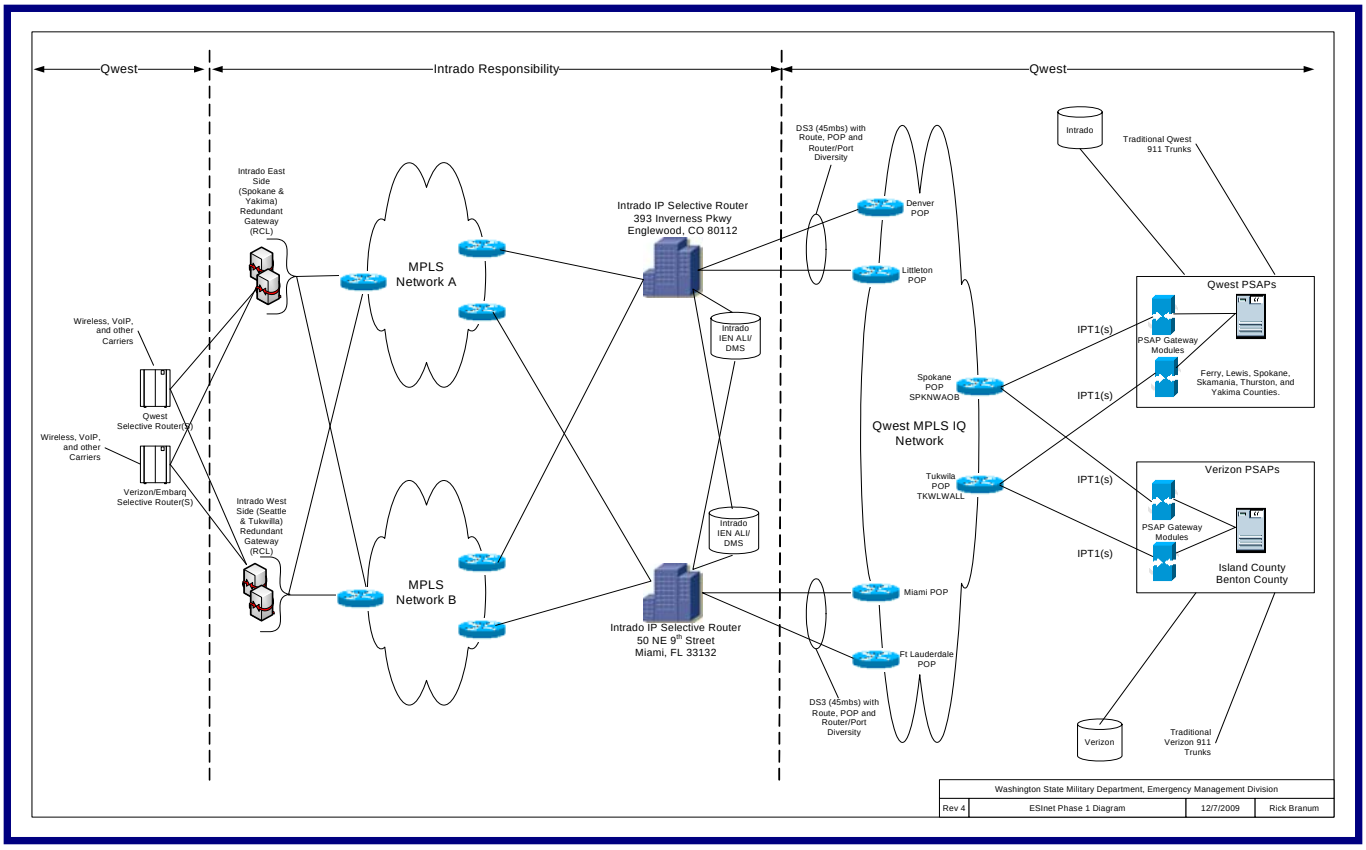


Figure 6: Washington Implementation - Phase 1

17. APPENDIX B: VERSION HISTORY

Version Date	Revision History
2010.03.15	Initial Issue
2010.06.24	• Added Appendix B: Version History section, • Corrected miss-spelling of A9-1-1 on 2nd page. • Minor grammar, punctiation, and formatting edits made as appropriate. • Deleted Non-Disclosure statement on Notice page.
2010.09.27	• Added “Each rack unit equals 1.75 inches.” to 3rd paragraph in section 9.0. • Added special instructions for PSAPs with more than 12 trunks to 3rd paragraph in section 9.0. • Moved the table previously on page 16 to page 7 and named the table “Power Consumption of NG 911 Equipment”. • Added new table on page 7 entitled “Heat Load – PSAP Equipment” • Corrected typo in 3rd bullet in section 9.4. • Revised FAQ section.
2010.10.20	• Added “Note” in section 7. • Revised both Tables in section 10. • Revised 5th bullet in section 15.